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[54] **DISCHARGE ELECTRODE STRUCTURE**

[76] Inventor: **Ching-Hsiang Lo**, No. 104, Huah-Cherng Rd., Shin-Juang City, Taipei Hsien, Taiwan

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[51] **Int. Cl.**[7] **H01J 1/02**

[52] **U.S. Cl.** **313/351**; 313/309

[58] **Field of Search** 313/351, 309, 313/336; 445/35, 49, 50, 51; 55/152

[56] **References Cited**

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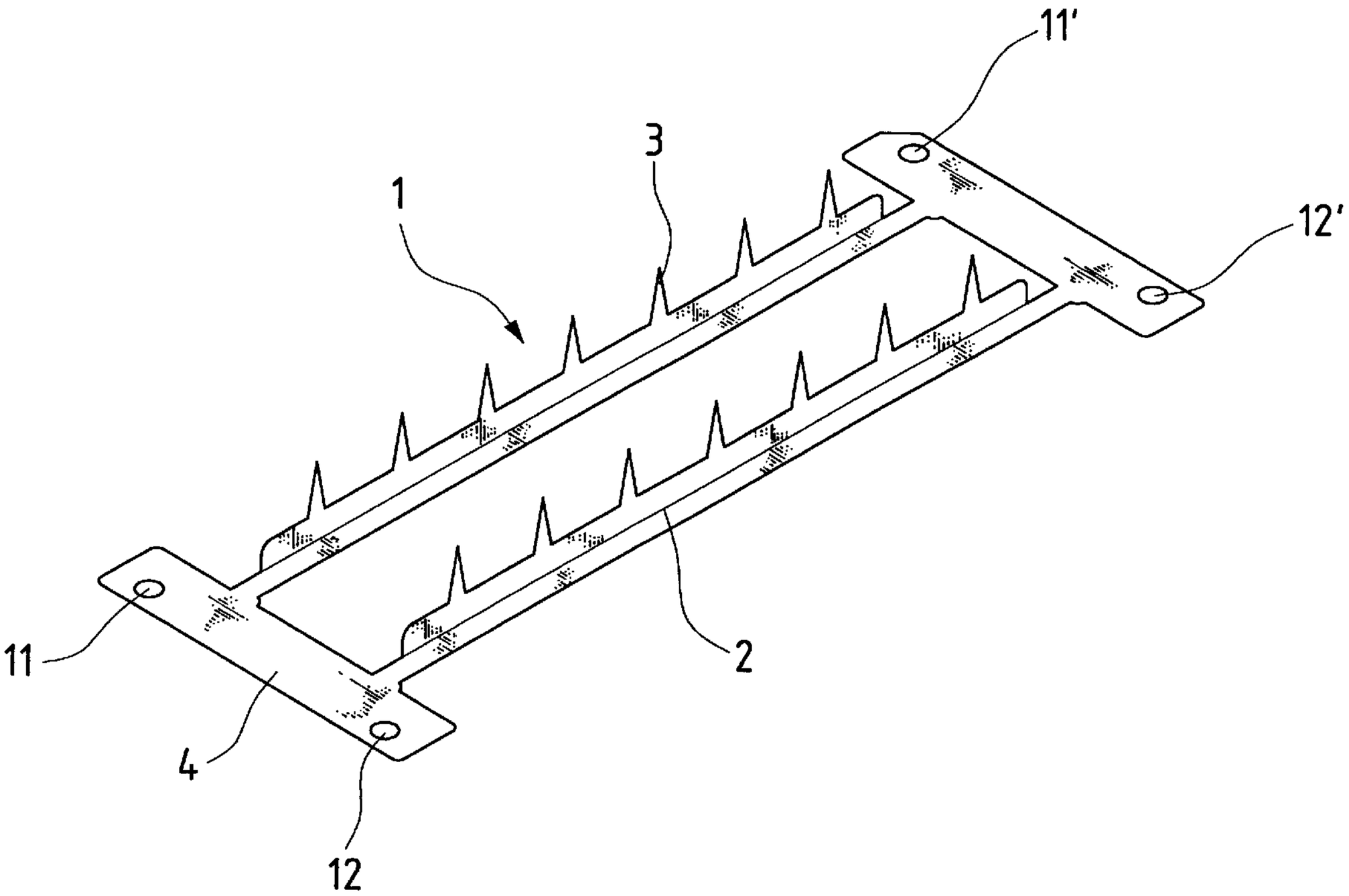
Primary Examiner—Michael H. Day
Assistant Examiner—Todd Reed Hopper
Attorney, Agent, or Firm—Dougherty & Troxell

[57] **ABSTRACT**

A discharge electrode structure which is a substantially II-shaped sheet unit integrally made from one single blank sheet. The discharge electrode sheet unit includes two conductive sections connected with each other by two bridge sections at two ends. Two sides of each bridge section are formed with screw holes. Each conductive section is formed with a middle transverse bar formed with multiple perpendicular discharge needles at equal intervals. Each discharge needle has a tip. After the discharge electrode is connected with a DC high voltage power supply, free electrons are produced by discharging. The tips of the discharge needles are perpendicularly arranged at equal intervals so that ionic equilibrium can be easily achieved.

3 Claims, 8 Drawing Sheets



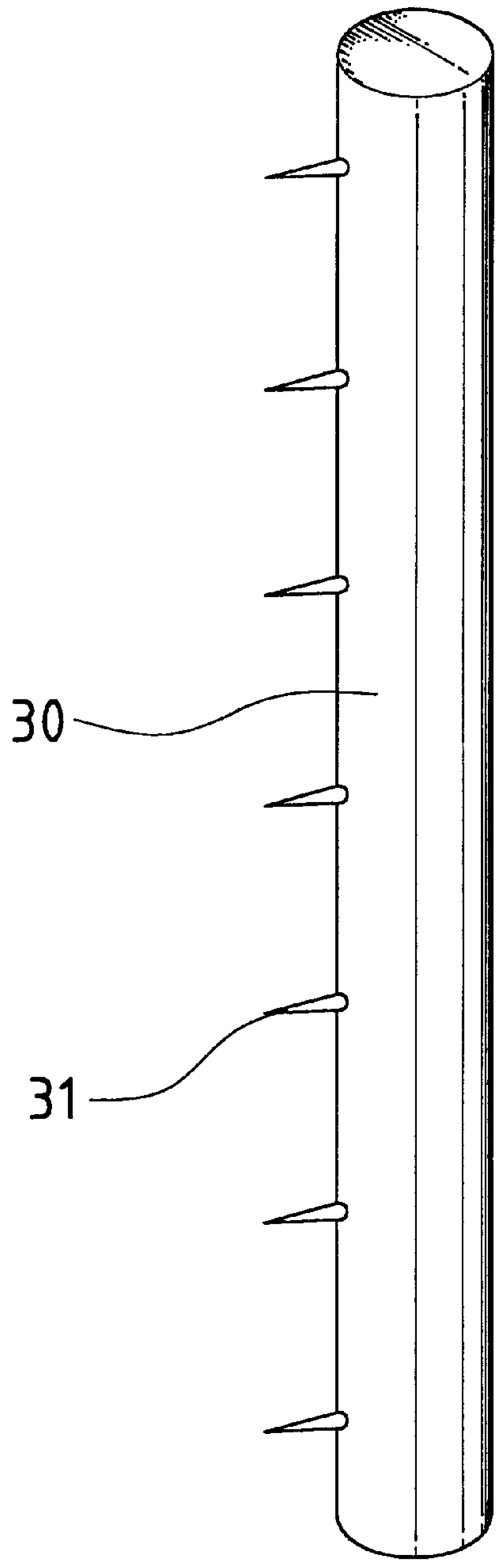


FIG.1A
PRIOR ART

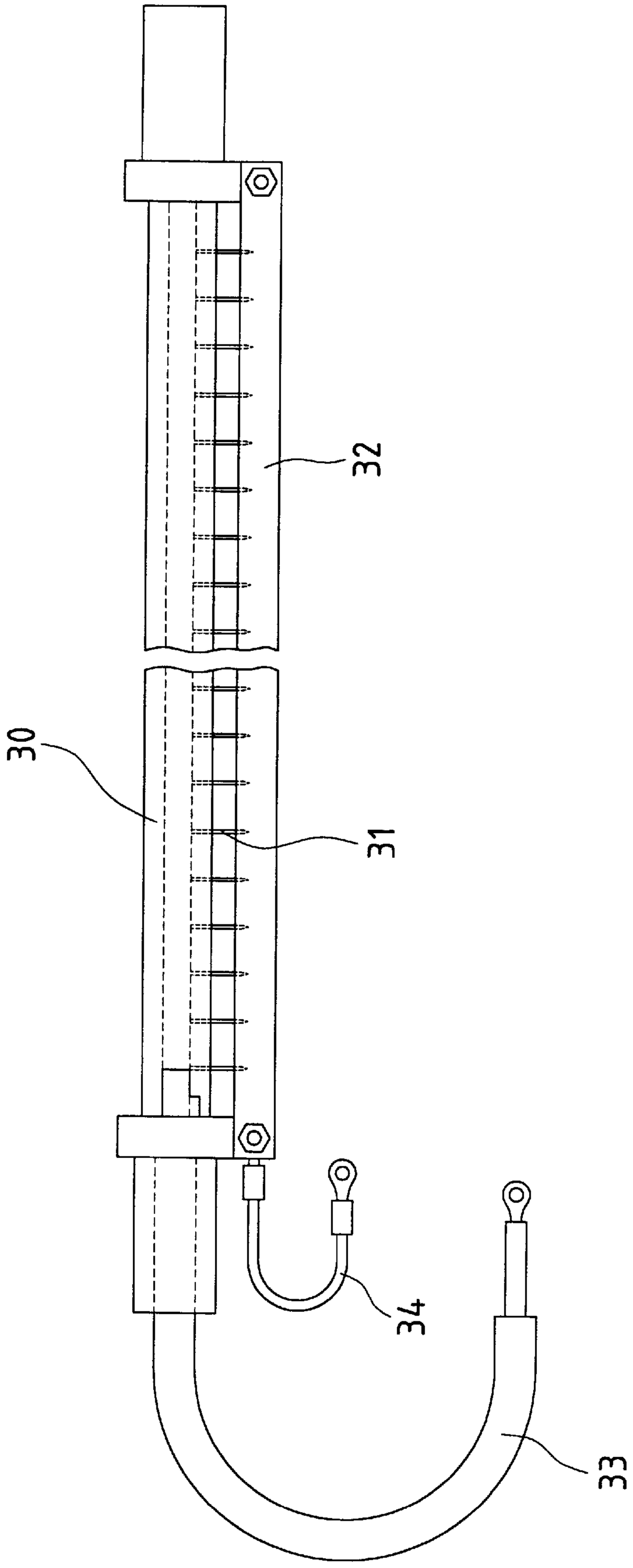


FIG. 1B
PRIOR ART

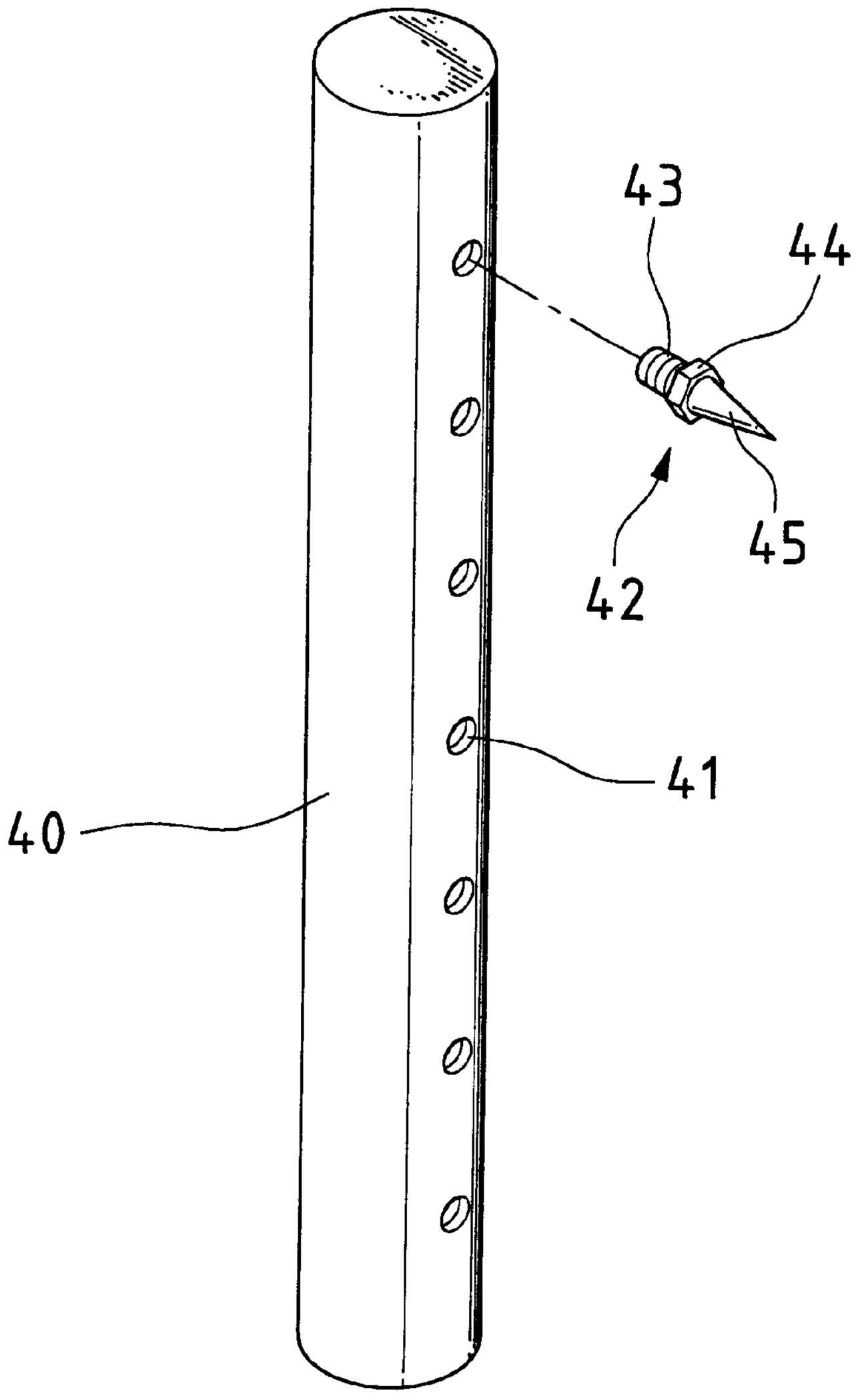


FIG.2
PRIOR ART

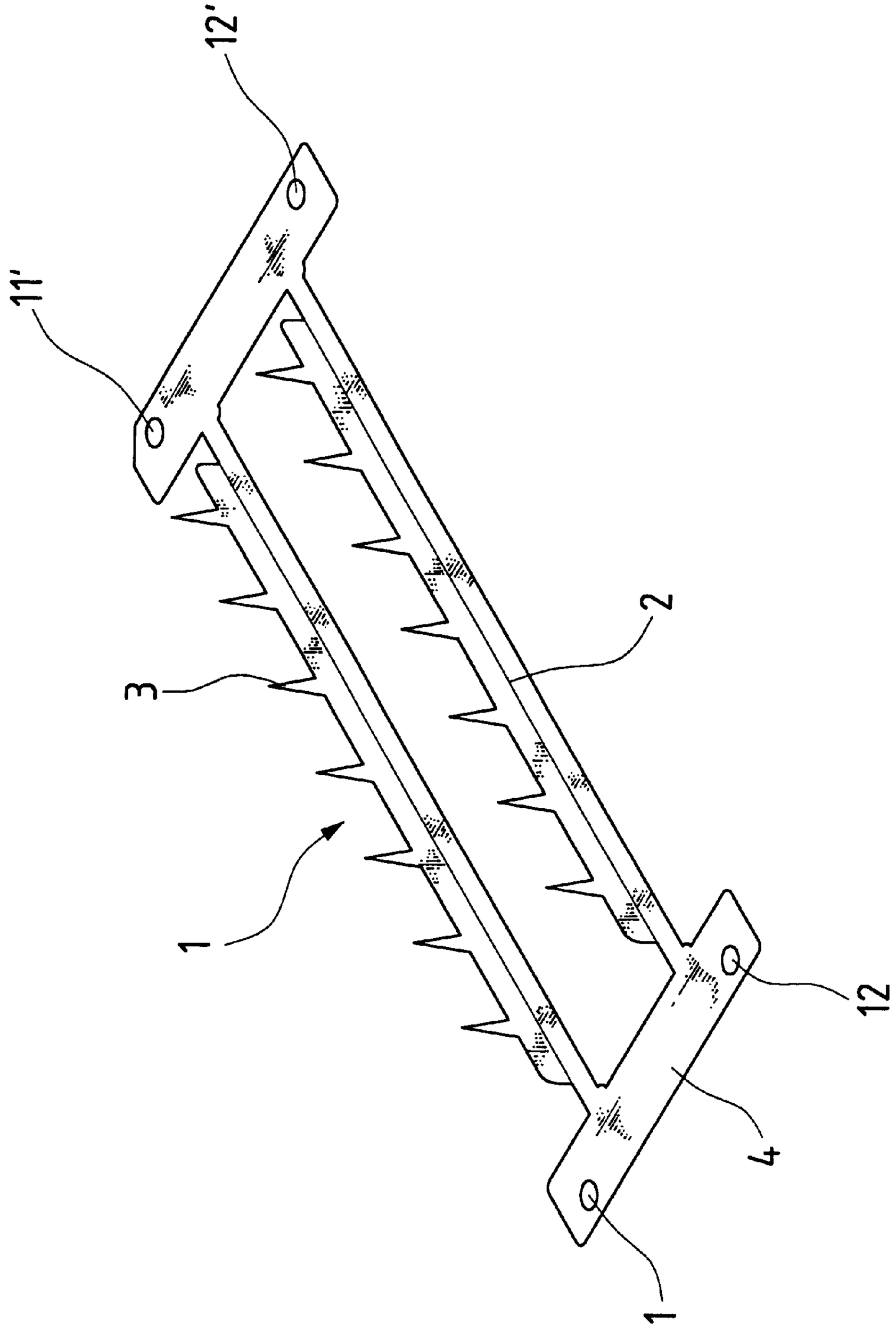


FIG.3

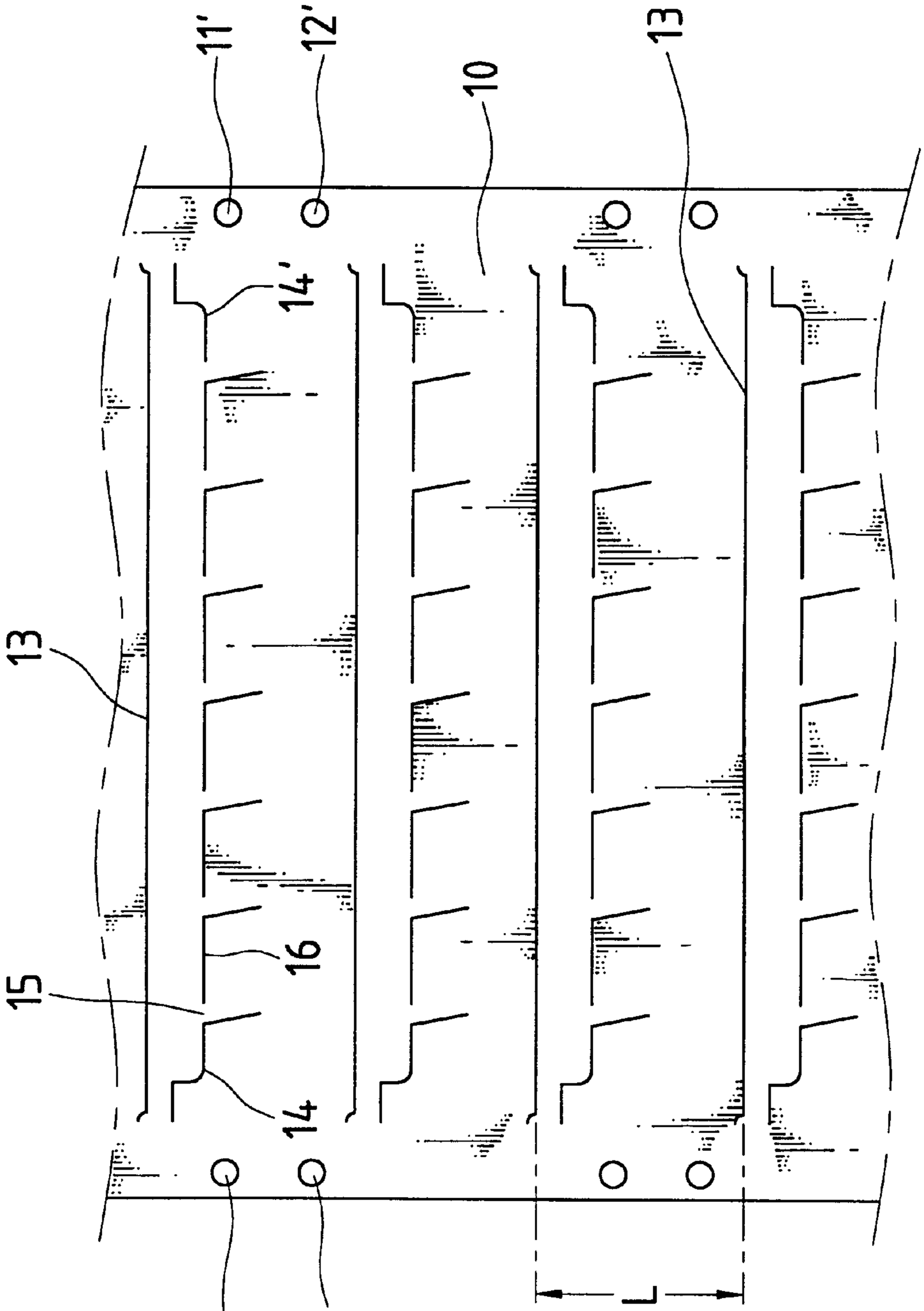


FIG.4

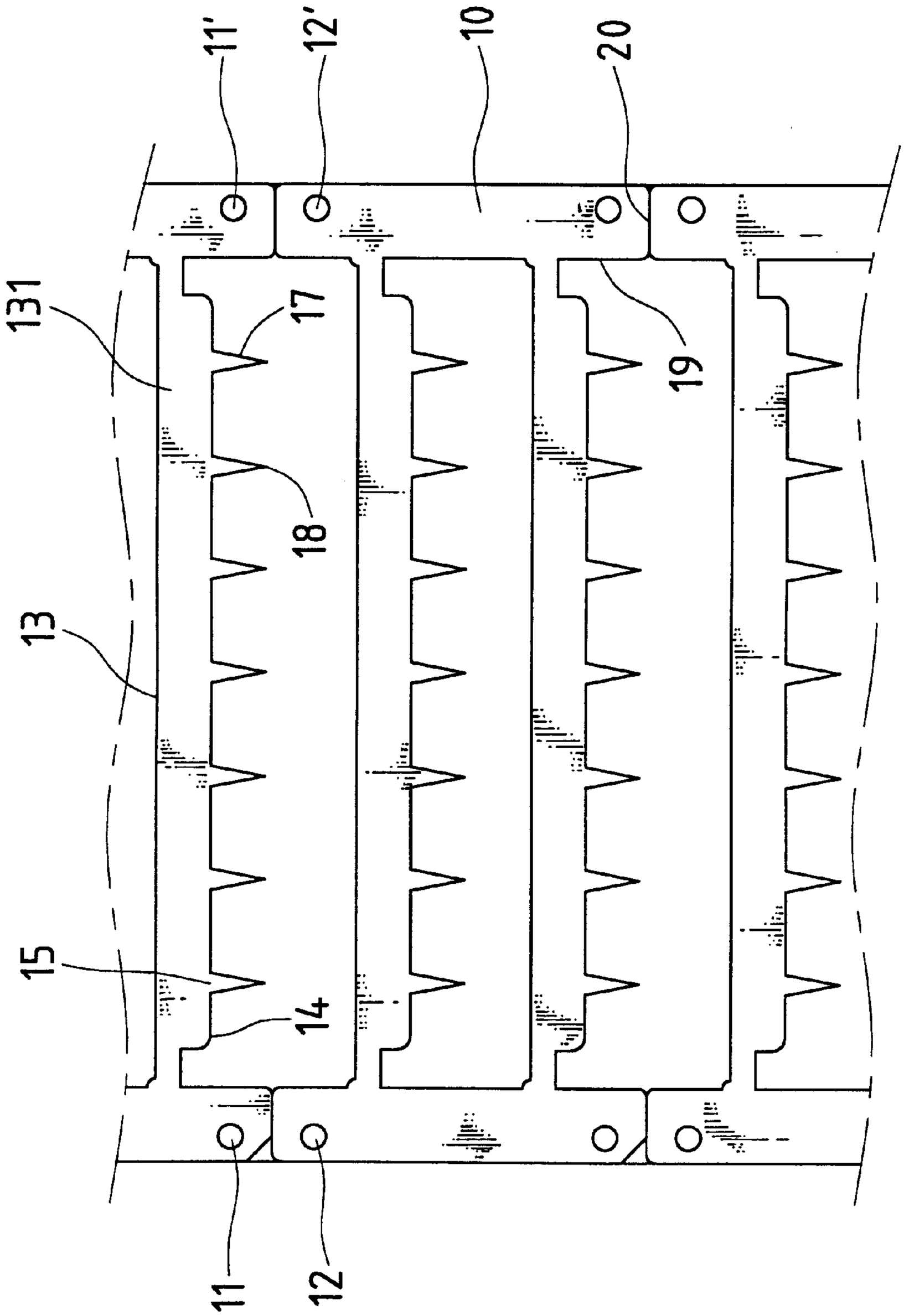


FIG.5

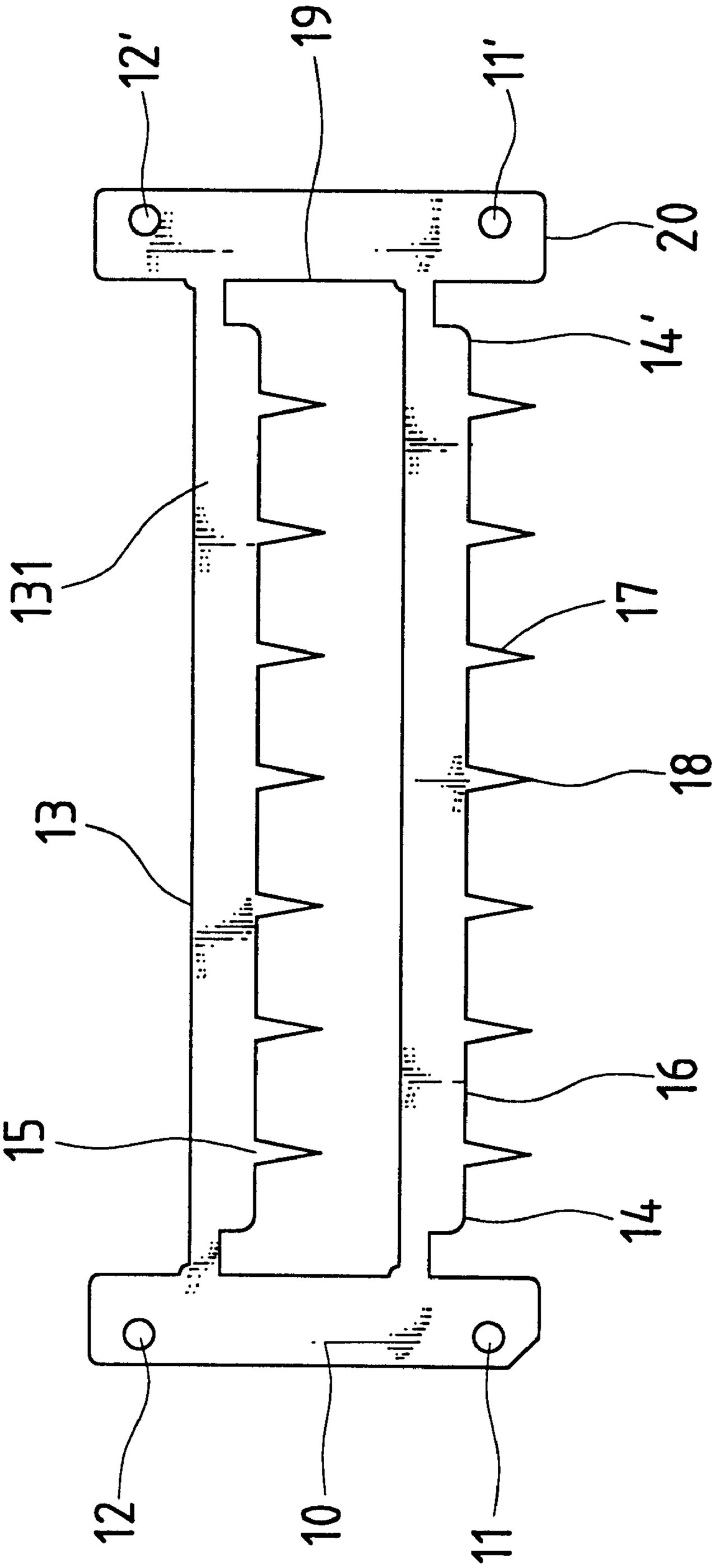


FIG.6

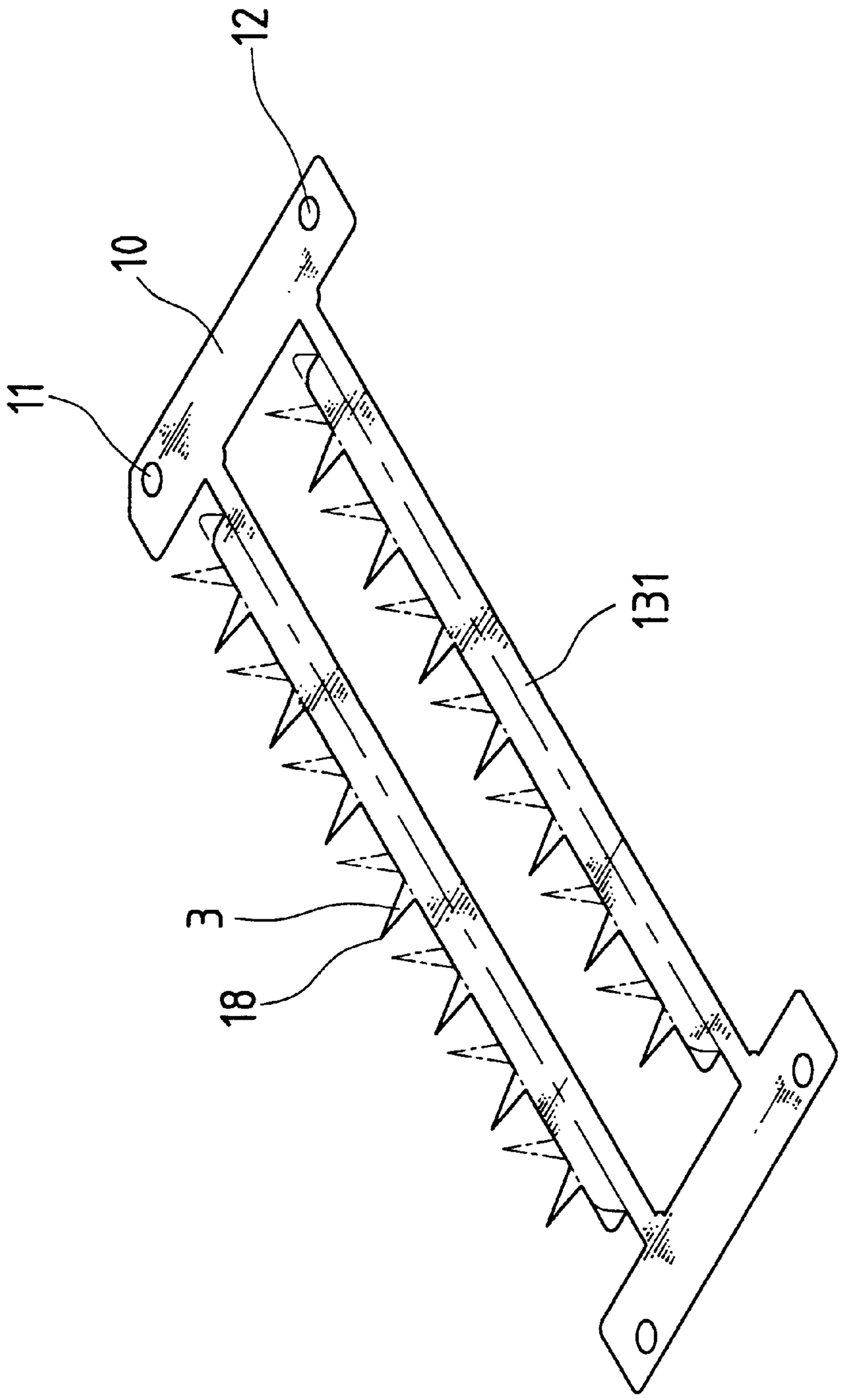


FIG.7

DISCHARGE ELECTRODE STRUCTURE

BACKGROUND OF THE INVENTION

The present invention relates to a discharge electrode structure, and more particularly to a discharge electrode including integrally formed discharge needles for easily achieving ionic equilibrium. The discharge electrode is applicable to a static-eliminating device.

FIGS. **1***a*, **1***b* and **2** show a commercially available discharge electrode applicable to static-eliminating device. In FIG. **1***a*, the discharge electrode includes a conductive rod **30** implanted with discharge needles **31** at equal intervals. In order to achieve optimal discharge efficiency, the distances between the respective discharge needles are strictly controlled to be equal to each other. In addition, the heights of the discharge needles projecting from the conductive rod **30** are also strictly controlled to be equal to each other. The tail ends of the discharge needles **31** are ground planely. One end of the conductive rod **30** is added with a positive electrode **33** and the upper side of the tips of the discharge needles **31** are connected with an electrode panel **32** with negative electrode **34** (as shown in FIG. **1***b*). Accordingly, the discharge needles will discharge from the tips and create a great amount of free electrons and ions to eliminate the static electricity.

FIG. **2** shows an existing tip discharge electrode including an elongated electrode shaft **40** formed with thread holes **41** at equal intervals. A discharge needle **42** is screwed into each thread hole **41**. One end of the discharge needle **42** is formed with outer thread **43**. A root section of the thread **43** is milled with a stopper nut **44** with a certain thickness. The other end of the discharge needle **42** is milled into a sharp conic section **45**. Such discharge needle is able to achieve better electric field and discharging effect. However, the manufacturing procedure is quite complicated.

It is known from the above that the conventional discharge electrode is manufactured by a quite complicated procedure under strict control of accuracy. Therefore, the production efficiency can be hardly promoted.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide a discharge electrode structure which is integrally formed and able to easily achieve ionic equilibrium.

It is a further object of the present invention to provide the above discharge electrode structure which is easily manufactured and able to achieve excellent discharging effect.

According to the above objects, the discharge electrode structure of the present invention is a substantially II-shaped sheet unit integrally made from one single metal sheet. The discharge electrode sheet unit includes two conductive sections connected with each other by two bridge sections at two ends. Two sides of each bridge section are formed with screw holes. Each conductive section is formed with a middle transverse bar formed with multiple perpendicular discharge needles at equal intervals. Each discharge needle has a tip. Free electrons are produced by discharging effect of the discharge electrode. The tips of the discharge needles are perpendicularly arranged at equal intervals so that ionic equilibrium can be easily achieved.

The present invention can be best understood through the following description and accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a perspective view of a conventional discharge electrode;

FIG. **1***b* is a plane view of a conventional static-eliminating device;

FIG. **2** is a perspective exploded view of another conventional tip discharge electrode;

FIG. **3** is a perspective view of the present invention;

FIG. **4** shows a first step of the punching operation of the present invention;

FIG. **5** shows a second step of the punching operation of the present invention;

FIG. **6** shows a third step of the punching operation of the present invention; and

FIG. **7** shows a fourth step of the punching operation of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Please refer to FIG. **3**. The present invention is a substantially II-shaped sheet body **1** integrally made from one single blank sheet. The discharge electrode sheet body includes conductive sections **2**, discharge needles **3** and bridge sections **4**. The bridge sections are integrally connected with the conductive sections. Two sides of each bridge section are formed with screw holes **11**, **11'**, **12**, **12'**. The conductive section **2** is formed with a middle transverse bar formed with multiple perpendicular discharge needles **3** at equal intervals.

Referring to FIG. **4**, the present invention is made of one single metal sheet **10**. Two ends of the sheet body **10** are punched with multiple adjacent screw holes **11**, **11'**, **12**, **12'**. The metal sheet **10** is sequentially punched with multiple long cut lines **13** at equal intervals. Each end of the long cut line **13** is formed with a short arch line. The other side of the long cut line **13** is punched with edge cut lines **14**, **14'** and obtuse cut lines **16** each having a turning section. The end of each obtuse cut line **16** is reserved with a small reservation section **15** not cut off Under the condition that the first row of long cut lines **13** is reserved with a fixed distance, the metal sheet **1** is respectively punched with second, third, fourth, nth rows of long cut lines **13**. Similarly, the edge cut lines **14**, **14'** and the obtuse cut lines **16** are disposed on opposite side along with the long cut lines **13**.

Referring to FIG. **5**, furthermore, another inclined cut line **17** reversely inclined to the obtuse cut line **16** is punched between the tail end of the horizontal line of the obtuse cut line **16** and the head end of the inclined line. The obtuse cut line **16** and the inclined cut line **17** together define a tip **18** of the discharge needle **3**. A lateral side of each edge cut line **14** is downward punched with a perpendicular cut line **19** and thin breakage line **20** between two screw holes **11**, **12** (**11'**, **12'**). A user can fold the metal sheet and break apart the metal sheet at the thin breakage line **20** so as to achieve the II-shaped discharge electrode (as shown in FIG. **6**).

Please refer to FIG. **7**. After the above processing procedure is completed, finally by means of a punching and folding operation, the transverse sheet **131** with the discharge needles **3** is upward folded at one half position of the sheet body into an upright state, whereby the discharge needle **3** is perpendicular to the transverse sheet **131** of the sheet body **10**.

The tip **18** of the discharge needle is formed by two cut lines so that the tip is very sharp. The above manufacturing procedure of the present invention is simpler than that of the conventional discharge electrode and the quality of the product is enhanced.

It should be noted that the above description and accompanying drawings are only used to illustrate one embodi-

ment of the present invention, not intended to limit the scope thereof. Any modification of the embodiment should fall within the scope of the present invention.

What is claimed is:

1. A discharge electrode structure which is a substantially II-shaped sheet unit integrally made from one single blank sheet, the discharge electrode sheet unit comprising conductive sections, discharge needles and bridge sections, the bridge sections at two ends of the sheet unit being integrally connected with the conductive sections, two sides of each bridge section being formed with screw holes, each conductive section being formed with a middle transverse bar formed with multiple perpendicular discharge needles at equal intervals, each discharge needle having a tip.

2. A discharge electrode structure as claimed in claim **1**, wherein a connection section between two adjacent discharge electrode units is formed with a thin breakage line.

3. A discharge electrode structure as claimed in claim **1**, wherein the tip of the discharge needle is formed by two cutting procedures.

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